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Experimenta in aere sunt facta : addenda ergo erit unicuique numero gravitas aeris, ut habeatur materialium gravitas in vacuo. Est autem aeris gravitas specifica ad illam aquæ, fere ut 1 ad 1000, utpote Philosophiæ naturalis cultoribus abunde patet.

VII. *Some Considerations about the Cause of the universal Deluge, laid before the Royal Society, on the 12th of December 1694. By Dr. Edmond Halley, R. S. S.*

THE Account we have of the universal Deluge is nowhere so express as in the Holy Scriptures ; and the exact Circumstances as to point of Time, do shew that some Records had been kept thereof more particularly than is wont in those things derived from remote Tradition, wherein the Historical *Minutiæ* are lost by length of Time. But the same seem much too imperfect to be the Result of a full Revelation from the Author of this dreadful Execution upon Mankind, who would have spoke more amply as to the Manner thereof, had He thought fit to lay open the Secrets of Nature to the succeeding Race of Men ; and I doubt not but to all that consider the 7th Chapter of *Genesis* impartially, it will pass for the Remains of a much fuller Account of the *Flood* left by the Patriarchs to their Posterity, and derived from the Revelation of *Noah* and his Sons. It must be granted, that there are some Difficulties as to the Construction of the *Ark*, the Reception and Agreement of the *Animals* among themselves, and Preservation of it in so immense and boundless an Ocean, during that *Wind* which

which God sent to dry the Waters away, especially when it first came on Ground : But it must also be allowed, that length of Time may have added, as well as taken away many notable Circumstances, as in most other Cases of the Story of remote Times and Actions.

This we may, however, be fully assured of, that such a Deluge has been ; and by the many Signs of marine Bodies found far from and above the Sea, 'tis evident, that those Parts have been once under Water : or, either that the Sea has risen to them, or they have been raised from the Sea ; to explicate either of which is a Matter of no small Difficulty, nor does the sacred Scripture afford any Light thereto. All that it says to help us is, that all the Fountains of the great Deep, *רֹבֶת־הַמִּזְרָחָה*, were burst, or broken up ; that the Windows, or Cataracts of Heaven were opened, and that it rained incessantly forty Days and Nights. Now the Rain of forty Days and Nights will be found to be a very small Part of the Cause of such a Deluge ; for supposing it to rain all over the Globe as much in each Day, as it is now found to do in one of the rainiest Counties of *England* in the whole Year, *viz.* about forty Inches of Water *per Diem*, forty such Days could cover the whole Earth with but about twenty two Fathom Water, which would only drown the low Lands next the Sea, but the much greater Part would escape. What is meant by the Fountains of the *Abyss* being broken up, and the opening of the Windows of Heaven, seems not so easy to be understood, but is intended to indicate the *Modus* of the Deluge, which was, according to the *Mosaic Philosophy*, from the letting in of the Waters above the Firmament, mentioned *Genesis* 1. 7. by the Windows

of Heaven ; and the rising up out of the Ground of the Waters under the Earth, spoken of in the second Commandment : Or, (if you will understand that by the *תְּהוֹם רַבָּה* is meant the great Ocean) by the overflowing of the Sea, rising upon the Land, which is express'd by the breaking up of the Fountains of the great Deep. So that we may reasonably conclude, that by the one of those Expressions is meant an extraordinary fall of Waters from the Heavens, not as Rain, but in one great Body ; as if the Firmament, suppos'd by *Moses* to sustain a *Supra-aerial Sea*, had been broken in, and at the same Time the Ocean did flow in upon the Land, so as to cover all with Water.

By an extraordinary Encrease of the Waters this could not be effected, for that at this Time there is not Water sufficient of itself to cover any more of the Earth than now it doth ; and to suppose a Creation and Annihilation of Water on purpose to destroy the Earth, is by much the most difficult Hypothesis that can be thought of to effect it. A change of the *Center of Gravity*, about which Center the Sea is formed, seemed not an improbable Conjecture, till it appeared that this Center of Gravity was the necessary Result of the Materials of which our Globe consists, and not alterable whilst the Parts thereof remained in the same Position : And besides this Supposition could not drown the whole Globe, but only that Part thereof towards which the Center of Gravity was translated, leaving the other Hemisphere all dry.

I shall say nothing of Dr. *Burnet's* Hypothesis, nor of the many Insufficiencies thereof, as jarring as much with the Physical Principles of Nature, as with the Holy Scriptures, which he has undertaken to reconcile.

cile. Dr. *Hook's* Solution of this Problem, as he has not fully discovered himself, I cannot undertake to judge of ; but his Compression of a Shell of Earth into a *prolate Spheroide*, thereby pressing out the Waters of an Abyls under the Earth, may very well account for drowning two extream opposite Zones of the Globe ; but the middle Zone, being by much the greater Part of the Earth's Surface, must by this means be raised higher from the Center, and consequently arise more out of the Water than before ; and besides, such a Supposition cannot well be accounted for from Physical Causes, but require a preternatural *digitus Dei*, both to compress, and afterwards restore the Figure of the Globe.

But the Almighty generally making use of Natural Means to bring about his Will, I thought it not amiss to give this Honourable Society an Account of some Thoughts that occur'd to me on this Subject ; wherein, if I err, I shall find my self in very good Company.

In Num: 190. of these Transactions, I have proposed the casual *Choc* of a *Comet*, or other transient Body, as an Expedient to change instantly the Poles and Diurnal Rotation of the Globe; at that Time only aiming to shew how the *Axis* of the *Earth* being chang'd, would occasion the Sea to recede from those Parts towards which the Poles did approach, and to encrease upon and overflow those Parts wherefrom the Poles were departed ; but at that Time I did not consider the great Agitation such a *Choc* must necessarily occasion in the Sea, sufficient to answer for all those strange Appearances of heaping vast Quantities of Earth and high Cliffs upon Beds of Shells, which once were the Bottom of the Sea; and raising up Mountains where none were before, mixing the Elements into

such a Heap as the Poets describe the *old Chaos* ; for such a *Choc* impelling the solid Parts would occasion the Waters, and all fluid Substances that were unconfined, as the Sea is, with one *Impetus* to run violently towards that Part of the Globe where the Blow was received ; and that with Force sufficient to rake with it the whole Bottom of the Ocean, and to carry it upon the Land ; heaping up into Mountains those earthy Parts it had born away with it, in those Places where the opposite Waves balance each other, *miserabiliter immixtis*, which may account for those long continued Ridges of Mountains. And again, the Recoil of this Heap of Waters would return towards the opposite Parts of the Earth, with a lesser *Impetus* than the first, and so reciprocating many times, would at last come to settle in such a Manner as we now observe in the Structure of the superficial Parts of the Globe.

In this Case it will be much more difficult to shew how *Noah* and the *Animals* should be preserved, than that all things in which was the Breath of Life, should hereby be destroyed. Such a *Choc* would also occasion a differing Length of the Day and Year, and change the Axis of the Globe, according to the Obliquity of the Incidence of the Streak, and the Direction thereof, in relation to the former Axis. That some such thing has happened, may be guess'd, for that the Earth seems as if it were new made out of the Ruins of an old World, wherein appear such Animal Bodies as were before the Deluge, but by their own Nature and Defences from the Weather, have endured ever since, either petrified, or else entire in *statu naturali*. Such a *Choc* may have occasioned that vast Depression of the *Caspian Sea*, and other great Lakes in the World ; and 'tis not unlikely, but that extream Cold felt in the

North-West of *America*, about *Hudson's-Bay*, may be occasioned by those Parts of the World having once been much more Northerly, or nearer the Pole than now they are; whereby there are immense Quantities of Ice yet unthaw'd in those Parts, which chill the Air to that degree, that the Sun's warmth seems hardly to be felt there, and of which the Poet might justly say, *Frigus iners illic habitat pallorque tremorque — Ac jejuna fames.*

If this Speculation seem worthy to be cultivated, I shall not be wanting farther to insist on the Consequences thereof, and to shew how it may render a probable Account of the strange Catastrophe we may be sure has at least once happened to the Earth.

VIII. *Some farther Thoughts upon the same Subject, delivered on the 19th of the same Month. By the same.*

I H A V E been advised since the last Day, by a Person whose Judgment I have great Reason to respect, that what I then advanced, ought rather to be understood of those Changes which might have happen'd to the Earth in Times before the Creation, and which might possibly have reduc'd a former World to a *Chaos*, out of whose Ruins the present might be formed, than of the Deluge whereby Mankind was in a manner extinguished about 4000 Years since; that being much more gradually brought to pass, and with some Circumstances that this Hypothesis cannot admit of, which abler Pens, perhaps, may account for: What I have advanced, I desire may be taken for no more